Rare somatic cells from human breast tissue exhibit extensive lineage plasticity.

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Funding Grants: Role of the tumor suppressor gene, p16INK4a, in regulating stem cell phenotypes in embryonic stem cells and human epithelial cells.

Public Summary:

Scientific Abstract:
We identified cell surface markers associated with repression of p16(INK4a)/cyclin-dependent kinase inhibitor 2A(CDKN2A), a critical determinant in the acquisition of a plastic state. These cell surface markers allowed direct isolation of rare cells from healthy human breast tissue that exhibit extensive lineage plasticity. This subpopulation is poised to transcribe plasticity markers, OCT3/4, SOX2, and NANOG, at levels similar to those measured in human embryonic stem cells and to acquire a plastic state sensitive to environmental programming. In vitro, in vivo, and teratoma assays demonstrated that either a directly sorted (uncultured) or a single-cell (clonogenic) cell population from primary tissue can differentiate into functional derivatives of each germ layer, ectodermal, endodermal, and mesodermal. In contrast to other cells that express OCT3/4, SOX2, and NANOG, these human endogenous plastic somatic cells are mortal, express low telomerase activity, expand for an extensive but finite number of population doublings, and maintain a diploid karyotype before arresting in G1.

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